
Improving Aptamer Selection Efficiency through Volume Dilution, Magnetic Concentration, and Continuous Washing in Microfluidic Channels.

Journal: Anal Chem

Publication Year: 2011

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PubMed link: 21774453

Funding Grants: Training Program in Stem Cell Biology and Engineering

Public Summary:

The generation of nucleic acid aptamers with high affinity typically entails a time-consuming, iterative process of binding, separation, and amplification. It would therefore be beneficial to develop an efficient selection strategy that can generate these high-quality aptamers rapidly, economically, and reproducibly. Toward this goal, we have developed a method that efficiently generates DNA aptamers with slow off-rates. This methodology, called VDC-MSELEX, pairs the volume dilution challenge process with microfluidic separation for magnetic bead-assisted aptamer selection. This method offers improved aptamer selection efficiencies through the application of highly stringent selection conditions: it retrieves a small number ($<10^6$) of magnetic beads suspended in a large volume (>50 mL) and concentrates them into a microfluidic chamber (8 μ L) with minimal loss for continuous washing. We performed three rounds of the VDC-MSELEX using streptavidin (SA) as the target and obtained new DNA aptamer sequences with low nanomolar affinity that specifically bind to the SA proteins.

Scientific Abstract:

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